

AMENDMENTS TO THE CLAIMS

Please amend the claims of the present application as set forth below. In accordance with the PTO's revised amendment format, a detailed listing of all claims has been provided. A status identifier is provided for each claim in a parenthetical expression following each claim number. Changes to the claims are shown by strikethrough (for deleted matter) or underlining (for added matter).

Claims 1-46 were originally filed.

Claims 1, 13, 34, 39, and 46 are amended without prejudice.

Accordingly, claims 1- 46 are pending.

Sw
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1. (Currently Amended) ~~An~~ A blending method comprising:
providing a set of examples that pertain to a shape or motion that is to be animated, the examples being provided relative to a multi-dimensional abstract space defined by at least one of an adjective and an adverb;

selecting a point within the multi-dimensional abstract space that does not coincide with a point that is associated with any of the examples, the selected point corresponding to a shape or motion within the abstract space;

computing a single weight value for each of the examples; and
combining the single weight values for each of the examples in a manner that defines an interpolated shape or motion that is a blended combination of each of the examples of the set of examples.

2. The blending method of claim 1, wherein said selecting is performed by an application.

1
2 3. The blending method of claim 1, wherein said selecting is performed
3 by a game application.

4
5 4. The blending method of claim 1, wherein said selecting is performed
6 at run time.

7
8 5. The blending method of claim 1, wherein said computing is
9 performed at run time.

10
11 6. The blending method of claim 1, wherein said computing and
12 combining are performed at run time.

13
14 7. The blending method of claim 1, wherein said computing comprises:
15 defining a cardinal basis for each example; and
16 evaluating the cardinal basis for each example relative to the selected point
17 to provide the weight value.

18
19 8. The blending method of claim 7, wherein the cardinal basis
20 comprises:

21 a radial basis function portion; and
22 another portion that is different from the radial basis function portion.

23
24 9. The blending method of claim 8, wherein said another portion is not
25 a radial basis function portion.

1
2 10. The blending method of claim 8, wherein said another portion is a
3 linear portion.

4
5 11. One or more computer-readable media having computer-readable
6 instructions thereon which, when executed by a computer, implement the method
7 of claim 1.

8
9 12. A computerized blending system that is programmed with
10 instructions which, when executed by the system, implement the method of claim
11 1.

12
13 A 13. (Currently Amended) ~~An~~ A blending method comprising:
14 linearly approximating a degree of freedom that is associated with a new
15 form or motion that is to be rendered based upon a plurality of examples that
16 define respective forms or motions within an abstract space;
17 defining a radial basis function for each of the examples;
18 combining the linear approximation and the radial basis functions to
19 provide a cardinal basis function; and
20 using the cardinal basis function to render the new form or motion.

21
22 14. The blending method of claim 13, wherein:
23 said acts of linearly approximating and said defining are performed for each
24 example; and
25

1 said combining comprises combining each of the respective linear
2 approximations and their associated radial basis functions to provide multiple
3 cardinal basis functions, one for each example; and

4 said using comprises combining the multiple cardinal basis functions to
5 define a function that describes the new form or shape within the abstract space.

6
7 15. The blending method of claim 13, wherein said defining comprises
8 scaling the radial basis function for each example.

9
10 16. The blending method of claim 15, wherein said scaling comprises
11 evaluating a matrix system to ascertain a plurality of scaling weights, individual
12 weights of which are used to scale the radial basis functions.

13
14 17. The blending method of claim 16, wherein said matrix system is
15 configured so that its evaluation yields scaling weights which, when used to scale
16 a corresponding radial basis functions, result in a combination of the radial basis
17 functions and the linear approximation to provide the cardinal basis function.

18
19 18. The blending method of claim 13, wherein the radial basis functions
20 are selected from a b-spline family of radial basis functions.

21
22 19. The blending method of claim 13, wherein said linearly
23 approximating comprises approximating the degree of freedom with a least
24 squares linear approximation.
25

1 20. One or more computer-readable media having computer-readable
2 instructions thereon which, when executed by a computer, implement the method
3 of claim 13.

4
5 21. A computerized blending system that is programmed with
6 instructions which, when executed by the system, implement the method of claim
7 13.

8
9 22. One or more computer-readable media having computer-readable
10 instructions thereon which, when executed by a computer, cause the computer to:

11 linearly approximate a degree of freedom that is associated with a new form
12 or motion that is to be rendered based upon a plurality of examples that define
13 respective forms or motions within an abstract space, by deriving basis
14 hyperplanes that fit a least squares hyperplane to a case where one example has a
15 value of 1 and the remaining examples have values of 0;

16 account for residuals between the example values and the hyperplane by:

17 associating a radial basis function with each example;

18 ascertaining a radial basis weight value for each radial basis
19 function; and

20 scaling each radial basis function by its ascertained radial basis
21 weight value; and

22 sum the linear approximation and scaled radial basis functions to provide a
23 cardinal basis function.

1 23. The computer-readable media of claim 22, wherein the instructions
2 cause the computer to perform the recited acts of linear approximation,
3 accounting, and summing for each example to provide multiple cardinal basis
4 functions.

5
6 24. The computer-readable media of claim 23, wherein the instructions
7 further cause the computer to sum the multiple cardinal basis functions to provide
8 a function that describes the new form or motion within the abstract space.

9
10 25. The computer-readable media of claim 24, wherein the instructions
11 cause the computer to select a point on the defined function and render a new form
12 or motion.

13
14 26. The computer-readable media of claim 22, wherein each radial basis
15 function has a width that is a function of the distance between its associated
16 example and the next nearest example in abstract space.

17
18 27. The computer-readable media of claim 22, wherein each radial basis
19 function is selected from the b-spline family of radial basis functions.

20
21 28. A computerized blending system comprising:
22 at least one computer-readable media;
23 at least one processor;
24 instructions resident on the computer-readable media which, when executed
25 by the processor, cause the blending system to:

1 linearly approximate a degree of freedom that is associated with a
2 new form or motion that is to be rendered based upon a plurality of examples that
3 define respective forms or motions within an abstract space, by deriving basis
4 hyperplanes that fit a least squares hyperplane to a case where one example has a
5 value of 1 and the remaining examples have values of 0;

6 account for residuals between the example values and the hyperplane by:

7 associating a radial basis function with each example;

8 ascertaining a radial basis weight value for each radial basis
9 function; and

10 scaling each radial basis function by its ascertained radial basis
11 weight value; and

12 sum the linear approximation and scaled radial basis functions to provide a
13 cardinal basis function.

14
15 29. The computerized blending system of claim 28, wherein the
16 instructions cause the blending system to perform the recited acts of linear
17 approximation, accounting, and summing for each example to provide multiple
18 cardinal basis functions.

19
20 30. The computerized blending system of claim 29, wherein the
21 instructions further cause the blending system to sum the cardinal basis functions
22 to provide a function that describes the new form or motion within the abstract
23 space.

1 31. The computerized blending system of claim 30, wherein the
2 instructions cause the blending system to select a point on the defined function and
3 render a new form or motion.

4
5 32. The computerized blending system of claim 28, wherein each radial
6 basis function has a width that is a function of the distance between its associated
7 example and the next nearest example in abstract space.

8
9 33. The computerized blending system of claim 28, wherein each radial
10 basis function is selected from the b-spline family of radial basis functions.

11
12 34. (Currently Amended) ~~An~~ A blending method comprising:
13 defining a set of examples that pertain to a form or motion that is to be
14 animated, the examples being provided relative to a multi-dimensional abstract
15 space defined by at least one of an adjective and an adverb;
16 examining a plurality of forms or motions that are animated within the
17 abstract space from the defined set of examples;
18 identifying at least one form or motion that is undesirable;
19 selecting a form or motion from a location within the abstract space that is
20 proximate a location that corresponds to the undesirable form or motion; and
21 replacing the undesirable form or motion with the selected form or motion
22 to provide a pseudo-example that constitutes a linear sum of the examples of the
23 set of examples.
24
25

1 35. The blending method of claim 34 further comprising, prior to said
2 examining, providing the plurality of forms or motions by, for each form or
3 motion:

4 linearly approximating a degree of freedom that is associated with a new
5 form or motion that is to be rendered based upon the set of examples;

6 defining a radial basis function for each of the examples;

7 combining the linear approximation and the radial basis functions to
8 provide a cardinal basis function; and

9 using the cardinal basis function to render the new form or motion.

10
11 36. The blending method of claim 35, wherein:

12 said acts of linearly approximating and said defining are performed for each
13 example; and

14 said combining comprises combining each of the respective linear
15 approximations and their associated radial basis functions to provide multiple
16 cardinal basis functions, one for each example; and

17 said using comprises combining the multiple cardinal basis functions to
18 define a function that describes the new form or shape within the abstract space.

19
20 37. The blending method of claim 36, wherein the radial basis functions
21 are selected from a b-spline family of radial basis functions.

22
23 38. The blending method of claim 37 further comprising, after said
24 replacing producing a plurality of new forms or motions by repeating said acts of
25 linearly approximating a degree of freedom, defining a radial basis function,

1 combining and using, the pseudo-examples influencing the shape of the cardinal
2 basis functions.

3
4 39. (Currently Amended) ~~An~~ A blending method comprising:
5 defining at least two examples of a form in a multi-dimensional abstract
6 space, the multi-dimensional abstract space being defined by at least one of an
7 adjective and an adverb, a first of the example forms being defined in a first
8 position in the multi-dimensional abstract space and a second of the example
9 forms being defined in a second position in the multi-dimensional abstract space
10 that is different from the first position; and

11 computing a form in the first position such that when the computed form is
12 subjected to a transform blending operation that places the computed form in the
13 second position, it will match the second example form.

14
15 40. The blending method of claim 39, wherein the first position is a rest
16 position.

17
18 41. The blending method of claim 39, wherein the first position is a rest
19 position and the second position is angularly displaced from the first position.

20
21 42. The blending method of claim 39, wherein said computing
22 comprises computing a plurality of vertices associated with the form.

23
24 43. The blending method of claim 42 further comprising, after
25 computing the plurality of vertices, geometrically blending the computed form in

1 the first position with the first example form in the first position to provide a
2 geometrically blended form in the first position.

3
4 44. The blending method of claim 43 further comprising after said
5 geometrically blending, transform blending the geometrically blended form to
6 provide the form that matches the second example form.

7
8 45. The blending method of claim 39, wherein the example forms
9 pertain to a skeleton-based figure.

10
11 A1 46. (Currently Amended) One of more computer-readable media having
12 computer-readable instructions thereon which, when executed by a computer,
13 cause the computer to:

14 define at least two examples of a form in a multi-dimensional abstract
15 space, the multi-dimensional abstract space being defined by at least one of an
16 adjective and an adverb, a first of the example forms being defined in a first
17 position in the multi-dimensional abstract space and a second of the example
18 forms being defined in a second position in the multi-dimensional abstract space
19 that is different from the first position; and

20 compute a form in the first position such that when the computed form is
21 subjected to a transform blending operation that places the computed form in the
22 second position, it will match the second example form.